Ensuring a successful UK research endeavour

A Review of the UK Research Councils by Paul Nurse

Consultation and Evidence Gathering

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Contents

1. Stakeholder Engagement

CALL FOR EVIDENCE

A Call for Evidence was launched at the outset of the review, and received 252 responses. A summary of these responses, together with a list of respondents, is included later.

ADVISORY GROUP

Members of the advisory group which supported Sir Paul Nurse in his review of research councils were:

- Professor Lord Sushantha Kumar Bhattacharyya, Kt, CBE, FREng, FRS
- Professor Muffy Calder, OBE, FRSE, FREng
- Professor Sir David Eastwood, DL, FRHistS
- Dame Janet Finch, DBE, DL, FAcSS
- Dr Paul Golby, CBE, FREng
- Professor Ottoline Leyser, CBE, FRS
- Professor Molly Stevens, FREng, FIMMM, FRSC, FRPharmS, FSB
- Professor Terry Wyatt, FRS

REFERENCE GROUP MEMBERSHIP

Members of the reference group used to help test emerging thinking throughout the review were:

- Professor Thomas Cech Nobel Laureate, former President of Howard Hughes medical institute and Professor at the University of Colorado
- Sir Peter Gluckman, Chief Scientific Adviser to Prime Minister of New Zealand
- Professor Ian Boyd, Chief Scientific Adviser to Department for Environment, Food and Rural Affairs (Defra)
- Baroness Onora O'Neill Emeritus Honorary Professor of philosophy at the University of Cambridge and former President of the British Academy
- Professor Christiane Nüsslein-Volhard, Nobel Laureate and Professor at the Max Planck Institute for Developmental Biology
- Professor Sir John Cadogan, Inaugural President of the Learned Society of Wales and former director general of research councils at the Office of Science and Technology
- Sherry Coutu, Angel Investor and entrepreneur
- Sir Richard Lambert, Chancellor of the University of Warwick and former director general of the Confederation of British Industry (CBI)

- Professor Sir Konstantin Novoselov, Nobel Laureate and Langworthy Professor in the School of Physics and Astronomy at the University of Manchester
- Professor Dame Julia Slingo, Chief Scientist at the Met Office
- Colin Smith, Director of Engineering at Rolls Royce
- Professor Sir Alan Wilson, Professor of Urban and Regional Systems in the Centre for Advanced Spatial Analysis at University College London
- Professor Rick Rylance, Chief Executive of the Arts and Humanities Research Council (AHRC); and Chair, research councils UK executive group, representing research councils UK
- Professor Sir Ian Diamond, Vice-Chancellor, University of Aberdeen, representing Universities UK
- Professor Alistair Fitt, Vice-Chancellor, Oxford Brookes University, representing the University Alliance
- Sir Michael Arthur, President and Provost, University College London, representing the Russell Group
- Dr Ruth McKernan, Chief Executive, representing Innovate UK

OTHER STAKEHOLDERS

During the course of the review, and in addition to the above, Sir Paul, the Advisory Group and Secretariat also consulted with the following:

- Research Council Chief Executives
- Lord David Sainsbury, former Minister for Science and Innovation
- Professor Lord David Willetts, former Minister for Universities and Science
- Lord William Waldegrave, Former Chancellor of the Duchy of Lancaster
- Eddie Morland, Chief Executive, Health and Safety Laboratory
- Rob Varley, Chief Executive, Met Office
- Dr Martyn Sené Chief Executive, National Physical Laboratory
- Professor Dame Sally Davies, Chief Medical Officer for England
- Professor Chris Whitty, Chief Scientific Adviser, Department for International Development (DfID)
- Dame Ann Dowling, President, Royal Academy of Engineering
- Robert-Jan Smits, Director General, Research and Innovation, European Commission
- Professor Sir John Bell, Chair, Office for Strategic Coordination of Health Research (OSCHR)
- John Cridland, Director-General, CBI
- Dr David Halpern, What Works National Advisor and Chief Executive of the Behavioural Insights Team
- David Sweeney, Director (Research, Education and Knowledge Exchange), Higher Education Funding Council for England (HEFCE)

Roundtable meetings were held in Scotland (Edinburgh, Strathclyde), Wales (Cardiff), and Northern Ireland (Belfast), and with Innovate UK and business stakeholders.

EVIDENCE AND REFERENCES

Sources of evidence and information referred to during the review process are listed in **Appendix B**.

2. Call for Evidence: Summary of responses

A summary of the main themes arising from the analysis of the responses to the Nurse Review Call for Evidence is provided here.

This evidence was considered by Sir Paul Nurse and the review's Advisory Group, and has informed the overall conclusions and recommendations of the review.

NUMBER OF RESPONSES

A total of **252** responses to the Call for Evidence were received. A breakdown of responses by type and by sector is at **Annex 1**. A full list of respondents is at **Annex 2**.

SUMMARY ANALYSIS

The call for evidence invited respondents to provide views in relation to four broad themes:

1. Strategic decision-making
2. Collaboration and partnerships
3. Balance of the funding portfolio
4. Ways of working

Summaries of the main points arising under each of the review's broad themes are provided below. Where possible, the balance of views on particular issues has been quantified; however it should be noted that not all respondents commented on all issues.

Some common messages which cut across the themes include:

- A need for greater transparency and more evidence-based decision-making at all levels.
- A need for a long-term, high-level overarching research strategy / investment framework.
- Suggestions that more could be done to support interdisciplinary research across organisational boundaries.
- Concerns over increases in the concentration of research and the potential for a loss of diversity in the research base as a result.
- A tension between the need for long-term stability and the need for agility and dynamism in research funding.
- Concerns over a perceived reduction in funding opportunities and level of support for early career researchers, partially as a result of a perceived shift away from funding for small grants towards longer, larger research programmes
- No great appetite for reducing the number of Research Councils
- A need to connect activities to ensure a continuum of support from basic research to translation and application

THEME 1: STRATEGIC DECISION-MAKING

Views were invited on how funding decisions are made; how society and government can engage with science funding decisions; how good decision-making can be encouraged at different levels; and how Research Councils can make the best decisions to ensure research drives economic growth and promotes health, quality of life and environmental sustainability.

The following questions from the review Terms of Reference were suggested as relevant here:

- How should the Research Councils take account of wider national interests including regional balance and the local and national economic impact of applied research?
- Is the balance between investigator-led and strategically-focused funding appropriate, and do the right mechanisms exist for making strategic choices?
- Within each Research Council is the balance of funding well-judged between support of individual investigators, support of teams and support of equipment and infrastructure?

There was a great diversity of views expressed in relation to how strategic decision should be made. 36 responses referenced the importance of the Haldane principle, with another 31 broadly supporting the principle that "research funding should be free from political interference". However, alongside this there was recognition that government had *a* role to play – for example, one respondent suggested "Councils must demonstrate direct support to government policy", another that "ministers should have an overt role in the location of large infrastructure".

Many respondents flagged the need for government to have an overarching well-informed, long-term research strategy, which would ensure the UK could take advantage of its strengths – a long-term research investment framework was seen by one as essential to "clarify government's expectations of Research Councils" – with another feeling that Research Councils were currently too focused on their role as funders, rather than the strategic partners they could be. A number of respondents suggested the organisational framework that might need to be put in place to develop such a strategy. For example:

- A strategic board of 12 members that sit for up to 5 years, including scientists, engineers MPs and CEOs.
- Greater public involvement to take into account wider national interests.
- A panel of departmental Chief Scientific Advisors (CSAs) providing strategic input to annual RC plans/strategies and define grand challenges.
- A cross-Council/cross-government infrastructure committee to review all scientific infrastructure funded by government.
- An overarching independent governance mechanism for the cross-Council RCUK partnership.
- A greater role for RCUK as coordinator of Research Council decision making.
- A 'Science Strategy Advisory Board', with representatives from Research Councils, Council for Science and Technology, research intensive government departments and scientific/business communities to advise BIS director general Business and Science on investment and capability.
- A stronger role for RCUK in bringing consensus across councils on new impact policies, etc.
- A UK Research Advisory Board to develop a similar long-term national strategy framework to the Science and Technology Facilities Council (STFC) Science Board's four-yearly 'programmatic review'.
- An executive advisory committee to set strategic roadmaps.
- Developing an overarching strategic framework, cf. the Swedish *Formas* Research Council approach.
- A combined board and subcommittees to consider strategic decisions from an interdisciplinary perspective.

A number also raised, as a precondition for a long-term research strategy, the need for long-term stable funding environment, and need for funding at internationally comparable levels.

A major theme which a number of respondents raised was the need for transparency around decision-making at all levels (both at government level and within Research Councils and their advisory boards and panels), including around long-term decisions to invest in research institutes at the expense of university grants. Several respondents highlighted that Research Councils should engage and consult extensively with researchers, potential users, relevant bodies (including devolved government and Local Economic Partnerships (LEP)) and the general public in shaping their strategies. One respondent was concerned that Research Councils were "too reliant on the suppliers doing the commissioning", and that they needed to challenge norms more. A number suggested that funding panels needed to reflect the needs of users better, with some respondents concerned that funding tended to follow previous funding, at the loss of 'risky research'.

Of the 82 respondents who provided an opinion on whether Research Councils had a role to play regionally, only 20% (17 respondents) thought Research Councils should have no regional role. However, views varied considerably on what that role might be, with an overarching worry that "a researcher with a good idea at one university [should not] be at a disadvantage because they are not in the desired location".

On the other hand, some respondents were concerned about the concentration of research funding in the golden triangle of Oxford, Cambridge and London. There was some feeling that the move by Research Councils towards longer and larger grants had led to increased concentration, with a suspicion that this move was as a result of admin pressures within councils. A number of respondents worried that this concentration would lead to a loss of dynamism and diversity in approaches being taken in research, and that this would lead to a loss of diversity in the research community itself.

A number of respondents worried that opportunities were drying up for early career researchers – with some suggesting this was an impact of concentration – or that small projects were losing out to larger projects at the loss of interesting science and opportunities for early career researchers who are not in a position to apply for large grants yet. A number of respondents suggested early career researchers needed to be better integrated into strategic decision making.

Of those who provided an opinion on the current balance between investigator-led and strategically-focussed funding, the most widely-held views were that the balance of funding between investigator-led and strategically-driven research is OK, or that it leans too far towards strategically-driven research (see also Theme 3). Government departments, however, typically responded differently to this question, with most expressing the belief that there was a need for more strategically-focused funding. Concerns were expressed that investigator-led research was not always "sufficient to handle emerging strategic issues", on which, for example, government needed evidence.

Although not mentioned in the review Terms of Reference or Call for Evidence, 34 respondents (spanning universities, charities, industry and professional organisations) commented specifically on the dual support system. There was a consensus that dual support underpins the success of the UK research base, and should be maintained.

"The Research councils and the dual support system have been the cornerstones of support for UK University research for the last century." (University respondent)

"The dual support system of funding research in universities is of critical importance in sustaining the international excellence of the UK research base" (University respondent)

"This system allows institutions to take strategic decisions about their research activities and provides flexibility to undertake blue skies research and respond to new opportunities. Crucially, it also allows a diversity of funders – including charities, industry, the European Union and overseas funders – to invest in university research, which has significantly contributed to the strength of the UK science base. We therefore encourage the government to continue its endorsement of the dual support system." (Charity respondent, endorsed by an industry respondent)

Other point which were raised under Theme 1:

- The need for a seamless pathway for funding for commercialisation between Research Councils, Innovate UK and other funders, recognising the complex nature of technology development.
- The potential for better strategic engagement with FTSE-250 companies.
- The need to work with government departments to build capability.
- The need for Research Councils to better engage with Devolved Administrations.
- The need for Research Councils to better serve the public engagement aspect of their Royal Charter objectives.
- The need for better futures/horizon-scanning to inform strategies.
- The role which cultural bodies outside the Higher Education Institutions (HEIs)sector can play.

THEME 2: COLLABORATION AND PARTNERSHIPS

Views were invited on the effectiveness of the Research Councils' interactions with each other and with external organisations, as well as the Research Councils' role in supporting collaborations and partnerships between institutions and between disciplines, and the links between Research Council-funded activities and other academic, industrial, European and global R&D activities.

The following questions from the review Terms of Reference were suggested as relevant here:

- How can the Research Councils catalyse collaboration between institutions?
- How should the work of the research councils integrate most effectively with the work of agencies funding innovation, such as Innovate UK, and with the work funded by Departmental research and development budgets?
- Should the funding of Research Councils be directed almost exclusively to the university sector, with organisations such as the Meteorological Office, the Health and Safety Laboratories and the National Physical Laboratory out of scope?
- Do they (the Research Councils) adequately support interdisciplinary research? Are the right arrangements in place to ensure optimal funding for research that crosses disciplinary boundaries?

Collaboration

150 responses commented on how the Research Councils catalyse collaboration between institutions. There was a general perception that collaboration between institutions already happens and is encouraged, but that there is room to improve or roll out existing measures more widely. Many respondents cited Doctoral Training Centres and Partnerships, sandpits and other Research Council-led networking and workshops as effective methods to promote collaboration, and there was support for increased sharing of datasets, infrastructure and equipment. Several respondents suggested that all funding calls should include a collaboration requirement. Others highlighted the importance of Research Councils as well as HEIs in contributing to regional collaboration, and one respondent suggested that Research Councils should guard against UK devolution having a detrimental impact on cross-UK collaboration. One university respondent highlighted that "the competitive nature of the system has undoubtedly contributed to the UK's research success. However, the balance between the benefits of collaboration and the benefits of competition is a fine one."

A small number of respondents suggested that collaboration cannot be forced, occurs naturally and must be researcher led; it is not for the Research Councils to demand it. The same respondents cautioned against the promotion of collaboration for collaborations sake, which could harm the principle of funding excellence.

There was a widely-held view that Research Councils have a role to play in improving academia-industry relationships. Industry needs a clearer message on how to work with Research Councils and Research Councils must take the lead. One respondent "would encourage BIS, Innovate UK and Research Councils to go further in prompting , within the co-ordinated programmes, the use of consortia involving universities, Independent Research Organisations and relevant industrial partners." Another respondent suggested that Research Councils should support more academics on secondments into industry, taking the Royal Academy of Engineering's Industrial Secondment Scheme as an exemplar. CASE studentships (formerly known as Collaborative Awards in Science and Engineering) , Impact Acceleration Accounts and the BBSRC 'Industry Club' model were also highlighted as effective mechanisms to support academic-industry engagement. Several respondents suggested that Research Councils could engage more closely with regional companies / SMEs.

Many respondents highlighted the complexity of the landscape around impact, which includes Research Councils, Innovate UK, Industrial Partnership Awards, Catapults, LEPs, UK Trade and Investment (UKTI), HEFCE, Catapult funds and BIS-European Regional Development Fund (ERDF) funding. An overarching view was that there is scope for development and need for greater cohesion in this complex landscape. Several respondents called for greater transparency in relationships and access to funds and a need to simplify the

landscape by standardising and streamlining. However a small number of respondents highlighted a need to make sure the focus on impact did not come at the expense of long term development and basic research.

Specifically in relation to Innovate UK, several respondents highlighted a need for Innovate UK to focus more on research areas falling within the remits of AHRC and Economic and Social Research Council (ESRC).

In terms of government departments, several respondents thought collaboration would be encouraged by allowing government researchers to take part in Research Council 'sandpit'-type activities. Several respondents thought there should be more scope for Research Council consultation with government departments to make joint decisions on priorities and capability needs. There was also a call for Research Councils to continue to collaborate with devolved administrations.

One respondent believed Research Councils should seek to attract more charitable and private investment into the science base.

Access to Research Council funding

Of the 120 respondents who commented on whether Research Council funding should be directed almost exclusively to the university sector, 47% (mainly those outside the HEI sector) thought that a wider range of organisations should be brought within the scope of Research Council funding (albeit with some caveats – see below), while 24% (mainly from the HEI sector) thought funding should be almost exclusively directed to HEIs. The remaining 29% did not state an explicit view but commented more broadly on the subject.

One respondent pointed out that Research Councils should ensure their current eligibility policy is widely understood by the community albeit this respondent continued by suggesting that Research Councils could consider taking a more nuanced approach to implementation of the policy, e.g. by extending eligibility for a certain funding call.

Main reasons cited in favour of funding being directed to the HEI sector included: a perception that non-HEIs would be distracted from their operational role if given access to Research Council funding; that science funding is already under too much pressure and increased administrative burdens. Many respondents highlighted the value of non-HEI partners but believed their role should be to collaborate with HEIs to apply for and work on Research Council funded projects.

Other reasons cited by respondents included the perception: that such a move would increase competition at the expense of collaboration, and that HEIs provide the necessary critical mass of high quality facilities and experienced staff. A small number of respondents pointed out that a significant proportion of Research Council funding already goes to non-HEIs

"We note a question that suggests the funding of Research Councils (RC) is directed 'almost exclusively to the university sector'. This is simply untrue… Indeed, the ONS UK Gross Domestic Expenditure on Research and Development 2013 report records that £,778M of £,2,899M (26.8%) of RC expenditure in the UK goes to non-HEIs, and a further £,200M goes to overseas activities (which are overwhelmingly non-HEIs). Thus in total 31.5% of RC expenditure is non-HEI. Government department R&D shows a very different split (28% to Public Research Institutes, 44% to business, 10% to HEIs, and 14.5% overseas)." (University respondent)

Main reasons cited in favour of a wider range of organisations being brought within scope included the view that funding should be available based on merit and quality, rather than risk losing out on potentially excellent research. Respondents mentioned Public Sector Laboratories, Non-Departmental Public Bodies (NDPBs), Agencies, Research Institutes and Catapults as organisations which should be eligible to apply for Research Council funds. The stipulation that eligibility for Research Council funding should be on a 'level playing field' basis extended to a suggestion that non-HEIs should only be able to bid for Research Council funds if HEIs were then able to bid for funds and opportunities only available to non-HEIs. Several respondents were of the opinion that this approach would only work if additional funding was available to reflect the wider range of organisations eligible to apply, rather than a redistribution of existing funds, and there were concerns that

Research Council funding should not be used to compensate for reductions in funding to these organisations from government departments.

Interdisciplinary Research

The need to better foster interdisciplinary research across organisational boundaries was a common theme – of the 154 respondents who commented on this issue, only 14% considered that the right arrangements were in place to ensure optimal funding for research that crosses disciplinary boundaries, while 46% considered that improvements could be made.

A general perception was that while interdisciplinary research is usually managed well within individual Research Councils, cross-Council interdisciplinary research is poorly handled.

"Inter-disciplinary work within the remits of the various councils works well, but anything between councils is problematic."(University respondent)

"In the area of research software, and in particular its role in world-leading interdisciplinary research, we believe that there are insufficient mechanisms for ensuring the research that crosses disciplinary boundaries is adequately funded." (University respondent)

"The Medical Research Council (MRC) and Biotechnology and Biological Sciences Research Council (BBSRC) have strongly complimentary research grant areas which can aid in promoting interdisciplinary research. However, interdisciplinary research combining the more disparate disciplines does not always have obvious funding channels. The Research Councils do provide joint calls such as the recent ESRC/BBSRC call on Epigenetics, but as in this instance, these calls often have very specific themes. Having such themes is very effective for starting up new projects but is of limited use for pre-existing, highly interdisciplinary research that is unlikely to fit with a theme designed to drive new fields of research. Such strongly thematic funding calls are not a sustainable way of managing long-term research projects with highly diverse themes." (Charity respondent)

Many respondents highlighted a need for longer timeframes when it came to interdisciplinary research, and a need for further standardisation of Research Council process and structure to foster successful interdisciplinary projects. 29 responses highlighted peer review as a hindrance to interdisciplinary approaches, with interdisciplinary projects often judged on individual components rather than as a whole. Several respondents called for specific interdisciplinary review panels, or special training for interdisciplinary reviewers, with consideration given to which reviewers are suitable to assess interdisciplinary bids. One respondent suggested establishing an European Research Council (ERC)-style scheme to encourage novel, risky, researcher-led, interdisciplinary research.

There were positive views that cross-Council themes work well (e.g. synthetic biology, food security) and that these could be enhanced through cross-Council interdisciplinary funding streams and the reinstatement of cross-council PhD studentships. Several respondents thought there was potential for better integration of arts, humanities and social sciences into interdisciplinary research. A small number of responses suggested that a percentage of the overall RC budget (suggestions ranged from 2–5%) should be top-sliced and used to support interdisciplinary research and other cross-Council activities.

A minority counter-view was that too much interdisciplinary funding and a focus on big multidisciplinary projects was diverting funding away from more important single discipline areas.

European and other global research activities

Amongst the 80 respondents who commented on international links, the most widely-held view was that the UK was well engaged with international research activities, but that there was scope to do more. Positive comments highlighted many examples of UK access to international funds, including Newton, Horizon2020, COFUND, UK India Education and Research Initiative (UKIERI), Joint Platform Initiatives, Marie Curie Innovative Training Networks (ITNs) and EU Research Grants. The Russell Group response stated that 13% of their universities' collective funding comes from EU Research Grants.

Some respondents felt that Research Councils should do more to help UK institutions gain access to international funds and to establish programmes with overseas partners. The US, Germany and Middle East were cited as countries offering particular potential for further link-up. A small number of responses highlighted the need to increase funding for big European research infrastructure and equipment such as CERN.

A number of respondents suggested that Research Councils should play a greater role in developing a longer term strategy for international collaborations and that they should have an increased role in promoting UK scientific interests overseas. There is a perception that currently the division of responsibilities between Research Councils and government in relation to the UK's scientific and research interests Europe is not clear. Several responses called for greater clarity and transparency on how UK institutions and government feed in to EU strategy.

One respondent suggested focusing more funding on smaller bilateral programmes rather than always on large multi-country European funds. Another respondent called for reducing the administrative burden associated with accessing EU funds which is off-putting to some researchers and institutions.

THEME 3: BALANCE OF THE FUNDING PORTFOLIO

Views were invited on the Research Councils' role in delivering an appropriately balanced portfolio of investments in science in the UK, taking into account factors such as government priorities / grand challenges, discovery and applied research, and geographical distribution.

The following questions from the review Terms of Reference were suggested as relevant here:

- Are the divisions of scientific subject areas between the research councils appropriate?
- Is the balance of funding between different Research Councils optimal?
- What are the gaps or holes in the funded portfolios of the research councils?
- How should the Research Councils take account of wider national interests including regional balance and the local and national economic impact of applied research?
- Is the balance between investigator-led and strategically-focused funding appropriate, and do the right mechanisms exist for making strategic choices?
- Within each Research Council is the balance of funding well-judged between support of individual investigators, support of teams and support of equipment and infrastructure?

Of the 113 respondents who submitted views in relation to the divisions of scientific subject areas between the Research Councils, 62 indicated that the divisions were broadly appropriate, albeit with some grey areas at the boundaries. In contrast, only 14 respondents believed the current divisions were arbitrary, were not optimal, or were out of date.

13 respondents felt that there was little to be gained by a structural reform of the divisions between scientific subject areas across the Research Councils, and that significant restructure would be disruptive and costly, while potentially yielding little benefit.

There was recognition that boundaries will exist between councils wherever divisions are drawn. The more important issue was considered by some to be ensuring an effective mechanism for funding and oversight of novel cross-council research or that which is at the interface of council remits, including the possibility of establishing a top-sliced or pooled fund as a means of dealing with this (see also Theme 2).

97 respondents expressed a view in relation to the balance of funding between Research Councils. Approximately a quarter of these (26) considered that the balance of funding between councils or subject areas was broadly right. A slightly smaller proportion of the respondents (16; 16%) believed the balance was inappropriate. The remaining respondents (55; 57%) highlighted the areas for improvement without providing a direct comment on whether the current funding split between councils was in balance.

Some respondents observed that the allocations appeared largely historical and that while some disciplines have grown in importance in recent years as global societal challenges have changed, the funding allocation has not changed to reflect this. This was particularly felt to be the case for arts, humanities and social science research, which currently receive the smallest allocations.

That the balance of funding between research areas should be regularly reviewed was a common response, including from those who thought the current balance was broadly right. There was a view that "the funding system needs agility to respond to disruptive shifts rather than maintaining the status quo" and that decisions about relative funding levels should reflect the dynamics of the full research ecosystem and not just consider Research Council budgets in isolation. Ensuring a means of enabling this is closely connected with views captures under 'strategic decision-making' (*see Theme 1 above*).

On the question of funding investigator-led versus strategically-focused programmes, the importance of ensuring a balance was consistently made. 82 respondents gave a direct view on the current balance: of these, the most

widely held views were that the balance was broadly appropriate (42 respondents; 51%) or that the balance was too far in favour of strategically-focussed programmes (36 respondents; 44%), and that there was a need for more investigator-led research which, it was felt, results in the greatest long-term impact. Several respondents who felt that the balance was currently about right qualified their statements by adding that the balance would no longer be appropriate if the current trend of increasing strategically-focused research continued. Only four respondents (5%) believed that funding was out of balance in the opposite direction, calling for more strategic programme funding. One response highlighted low success rates in investigator-led research as a key problem, arguing that this deters potentially excellent applications.

"The review might examine success rates across the [Research Councils]*; we fear it might conclude that higher numbers of excellent, highly-ranked proposals for research are not now being funded."* (Academy respondent)

A point made by a number of respondents was that research is a continuum, where both curiosity-driven / investigator-led and strategically-targeted research have their place. A small number of respondents called for more funding for translation of research, but a more frequently expressed view was that more needed to be done to connect activities by different actors across the full Technology Readiness Levels chain to most effectively exploit research.

This links to questions of how the Research Councils should take account of wider national interests in research funding decisions (see also Themes 1 and 2). Clear support was expressed for the focus on excellence as the primary criteria for funding decisions. There were also calls for a more strategic approach at a high level. In this respect the '8 Great Technologies' and Industrial Strategy were welcomed by those who referenced them, although some thought they could be better aligned. Road-mapping for a given research theme was also highlighted as a means to better connect activities in different stages of the research continuum.

Some notes of caution were sounded in response to questions over the balance of the funding portfolio. These included the risks of making radical changes – current long-term commitments mean that any changes need to be gradual – as well as risks related to over-specialisation. For example, one response urged that the breadth of the UK's strength across disciplines be protected, expressing concerns that over-specialism would weaken the UK's strength in breadth and ability to be nimble and responsive.

Other frequently expressed views in response to questions on balance of funding included a need for more support for early career researchers. Well-established researchers were seen as disproportionately funded at the expense of 'the next generation' of researchers, a situation which one respondent believed could lead to national crisis in the next few decades if not addressed. Some cited a trend towards larger and longer grants as excluding early career researchers, and that increasing the proportion of short-term and smaller grants in the overall portfolio would be a means of helping to address this. Some respondents indicated that Research Councils could do more to help support training and career development for researchers at all levels.

A number of issues were highlighted around the funding of equipment and infrastructure. These included the need for on-going operational funding to match capital funding, and that the requirement for an institutional contribution to match-fund new equipment was challenging. The importance of pooling and sharing of equipment and infrastructure, in order to maximise efficiencies, was recognised.

THEME 4: EFFECTIVE WAYS OF WORKING:

Views were invited on how the Research Councils can operate most effectively within the wider science and innovation system, recognising what works well and identifying opportunities for improvements. Respondents were encouraged to consider issues such as the strategic leadership provided by the Research Councils, how Research Councils engage with their communities, and the operation of the peer review system.

Peer review system

123 respondents provided views on the peer review system, with the top five areas requiring improvement identified as:

- the quality and composition of the review panel (by 50 respondents)
- assessment of inter-/cross-disciplinary research (by 38 respondents)
- transparency of the process and funding decision (by 17 respondents)
- costs and duration of the process (by 17 respondents)
- providing constructive feedback to applicants (by 14 respondents)

In addition, several respondents welcomed the introduction of two-stage assessment processes for some schemes and two respondents suggested that current Research Council / peer review mechanisms tended to favour projects with lower risks.

To improve the quality of the refereeing, some respondents recommended expanding the assessor pool to engage more industrialists, end users and international experts. It was also suggested that Research Councils should provide guidance and training to panels and reviewers, particularly to those required to assess interdisciplinary research. To reduce bias, two organisations recommended implementing a double-blind peer review system introduced by the journal Nature recently. It was also suggested a harmonised approach and system should be carried out across councils.

Respondents had different opinions with regards to demand management, although adopting a common approach across Research Councils was considered desirable. Whilst some respondents agreed that it was necessary to restrict numbers of applications from each institution, others felt that such an approach would create barriers for collaborative or cross-disciplinary or blue skies research. It was also felt that demand management was against the principle of peer review where scientific excellence should be the primary selection criteria. Three organisations suggested using lottery draws to make the final funding decision for applications deemed fundable.

There were concerns over the introduction of minimum grant value for Responsive Mode projects by some councils, with a perception that this was leading to a decline in support for early career researchers due to loss of smaller grant opportunities.

The call for evidence was supplemented by members of the advisory group consulting their peers on their experience of the peer review process.

Strategic leadership provided by the Research Councils

62 respondents commented on the strategic leadership provided by the Research Councils, and views were very varied. Some respondents believed that the Research Councils played an important and strategic role in setting the agenda for the research community and influencing strategy of the complex research ecosystem within the UK. Others suggested that there was a need for greater leadership across councils and disciplinary boundaries, as well as in engaging scientific and social experts, Innovate UK and other government departments in horizon scanning, and use of conferences to set future strategic priorities. Several respondents suggested that the

leadership would be strengthened by a better coordination across the Councils and better support provided by RCUK.

Respondents also highlighted the Research Councils' role in areas such as fostering an employment environment that supports more attractive, sustainable research careers, and in promoting equality and diversity in the research base.

Several responses commented on the potential benefits of having greater leadership and advocacy in the humanities and social sciences.

How Research Councils engage with their communities

Views on how well the Research Councils engaged with their communities were mixed, with some respondents citing examples of good practice such as engagement via research committees and on-site visits to HEIs, although there was some concern that loss of staff and reduced admin budgets was impacting on the Research Councils' abilities to do this. The importance of engaging with the whole sector was highlighted, with some of the less research-intensive universities emphasising that all universities must be given the same opportunities to engage in forthcoming thematic or strategic calls, aligned with the principle of supporting research excellence wherever it is found. Several non-HEI organisations supported this and suggested that Research Councils should undertake more regional meetings to disseminate information about funding opportunities and good practice in preparation of grant applications. One respondent recommended that Research Councils should consider more innovative communication methods, e.g. webinars to ensure an equal communication to all HEIs. Three respondents suggested that secondment and people exchange between universities and Research Councils, at both director and programme manager level (as done in the US by National Science Foundation (NSF)), would improve engagement of Research Councils with their communities. The need for Research Council staff to have appropriate expertise to engage with and provide advice to applicants was highlighted.

Four universities commented specifically on the need for better communication around forthcoming calls for research proposals, with short timescales between the announcement of new funding opportunities and the deadlines for submission of applications limiting the time available for the creation of bids. This was a particular issue for inter-/cross-disciplinary calls.

Several learned societies, professional bodies and consortia group suggested that Research Councils should work more closely with them for better engagement with the general public and the research community. Both HEI and non-HEI organisations felt that Research Councils should involve and consult them at an early stage of strategic decision making and rolling out new policies.

With regards to engaging industry, there was concern that there was a lack of visibility for medium-sized enterprises. There was a view that engagement with industry could benefit from a simplified structure and funding schemes and support for helping business make the right connections with the research base.

Other operational issues

One of the clearest messages was the need for more consistent, standardised and streamline processes and systems for managing funding schemes across the councils. Related to this, there was a strong view that there should be greater collaboration between Research Councils more generally, and that this should be addressed as a main priority. A need for a robust performance management framework to evaluate and report on success was also suggested.

Several respondents commented on the need for up-to-date systems that were interoperable with those of Research Organisations, to enable a better provision of research information (e.g. Je-S, Gateway to Research and Researchfish). In particular there was a view that current processes for reporting on research outcomes were time-consuming and inefficient.

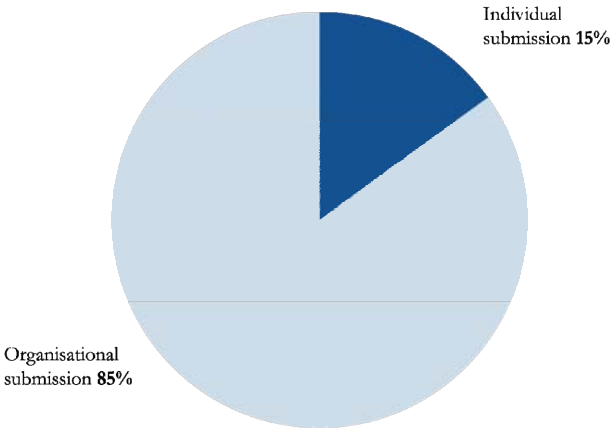
Respondents expressed concern that excessive administrative were limiting the Research Councils' strategic capacity and ability to engage with their communities and with other funding agencies. There were also concerns

that policies introduced by Research Councils in order to make administrative savings often simply shifted the administrative and cost burden onto HEIs.

A significant number of respondents commented on Research Councils' funding for doctoral training, although views on this were varied. Some respondents believed that approaches should be harmonised across councils, whilst other believed that a single model for doctoral training would be inappropriate.

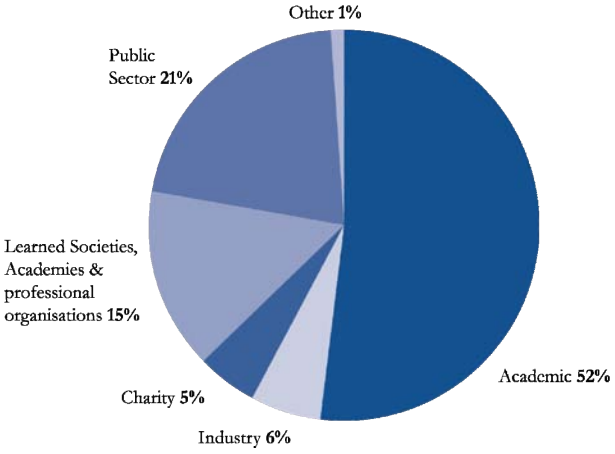
2.1 Breakdown of responses to the Call for Evidence

By response type:



	Number of responses	Proportion of total
Individual submission	39	15%
Organisational submission	213	85%

By sector:



	Number of responses	Proportion of total
Academic	131	52%
Industry	15	6%
Charity	12	5%
Learned Societies, Academies & professional organisations	38	15%
Public sector	54	21%
Other	2	1%
Total	**252**	

2.2 List of Respondents to the Call for Evidence

Inclusion of an organisation in the list indicates that written evidence was submitted either by the organisation listed in the form of an organisation-level response, or by an individual or group of individuals from that organisation.

Aberystwyth University

Academy of Medical Sciences

Academy of Social Sciences and the Campaign for Social Science

Agri-food and Biosciences Institute (AFBI)

Agriculture and Horticulture Development Board (AHDB)

Association for Innovation, Research and Technology Organisations (AIRTO)

Arts and Humanities in Society Working Group of the Royal Society of Edinburgh's Young Academy

Association of Medical Research Charities (AMRC)

Association of Research Managers and Administrators (ARMA)

Association of the British Pharmaceutical Industry (ABPI)

Aston University

Astrophysics Group at the Mullard Space Science Laboratory – University College London (UCL)

Babraham Institute

Bangor University

BioImagingUK

Birmingham City University

Bournemouth University

BP

British Academy

British Ecological Society

British Educational Research Association

British Heart Foundation

British International Studies (BISA)

British Library

British Machine Vision Association and Society for Pattern Recognition

British Medical Association

British Pharmacological Society

British Trust for Ornithology

Brunel University London

Campaign for Science and Engineering

Cancer Research UK

Cardiff University

Confederation of British Industry (CBI)

Cell Therapy Catapult

Centre for Environment, Fisheries and Aquaculture Science

Challenger Society for Marine Science

Chemistry Department – University of Sheffield

Chief Medical Officer and Chief Scientific Adviser – Department of Health

Cohort & Longitudinal Studies Enhancement Resources (CLOSER) – UCL

Colbalt Light Ltd

Council for Mathematical Sciences

Council for Science and Technology

Coventry University

Chief Scientific Advisers of UK government departments

Daphne Jackson Trust

De Montfort University

Department for Environment, Food and Rural Affairs (Defra)

Department for Employment and Learning

Diamond Light Source

Durham University

Eastern ARC

ELIXIR

EMBL-European Bioinformatics Instititue

Faculty of Engineering – University of Sheffield

Food and Environment Research (Fera) Science Ltd

Glasgow Caledonian University

Goldsmiths, University of London

GlaxoSmithKline (GSK)

GuildHE and Consortium for Research Excellence, Support and Training (CREST)

GW4 Alliance

H8 Standing Committee, British Academy Section

Heads of Chemical Engineering UK (HCEUK)

Health and Safety Laboratories, the Met Office and the National Physical Laboratory.

Higher Education Funding Council for England (HEFCE)

Heriot-Watt University

Higher Education Funding Council for Wales (HEFCW)

Imperial College London

Independent Research Organisations Heads of Research Group

Innogen Institute – University of Edinburgh

Innovate UK

Institute for Government

Institute of Evolutionary Biology – University of Edinburgh

Institute of Food Research

Institute of Physics

Institution of Chemical Engineers (IChemE)

Institution of Engineering and Technology

Institution of Environmental Sciences

Jaguar Land Rover Ltd

James Hutton Institute

Jisc

John Innes Centre

Joint Nature Conservation Committee

Keele University

King's College London

Knowledge Transfer Network (KTN)

Lancaster University

Learned Society of Wales

Liverpool John Moores University

London School of Economics and Political Science (LSE)

London School of Hygiene & Tropical Medicine

London South Bank University

Loughborough University

Manchester Metropolitan University

Medical Schools Council

Meteorological Office

million+

MRC Clinical Sciences Centre

MRC Lifecourse Epidemiology Unit

MRC Laboratory of Molecular Biology

MRC / Wellcome Trust Behavioural and Clinical Neuroscience Institute (BCNI)

N8

National Centre for Atmospheric Science

National Heritage Science Forum

National Institute for Social Care and Health Research (NISCHR)

National Nuclear Laboratory (NNL)

National Oceanography Centre

National Physical Laboratory

Natural England

Natural History Museum

Natural Environment Research Council (NERC) – British Antarctic Survey

NERC National Centre for Earth Observation

Norwich Research Park Doctoral Training Partnership (DTP)

Norwich University of the Arts

Nottingham Trent University

Nuclear Innovation and Research Advisory Board

Nuffield Council on Bioethics'

Open University

Oxford Brookes University

PHG Foundation

Physiological Society

Plymouth University

Political Studies Association

PraxisUnico

Public Health England

Queen Mary University of London

Queen's University Belfast

Rainbow Seed Fund
Research Councils UK (RCUK)
RCUK Energy Strategy Fellowship team
Regional Studies Association
Research Complex at Harwell
Rolls-Royce
Rothamsted Research
Royal Academy of Engineering
Royal Astronomical Society
Royal Botanic Gardens, Kew
Royal College of Nursing
Royal Geographical Society (with IBG)
Royal Society
Royal Society Edinburgh
Royal Society of Chemistry
Royal Statistical Society
Russell Group
Satellite Applications Catapult Ltd
Sciencewise
Science Museum Group
Science Policy Research Unit – University of Sussex
Scotland's Rural College
Scottish Environment Protection Agency
Scottish Funding Council
Scottish government
Scottish Natural Heritage
Scottish Universities Environmental Research Centre
Scottish Universities Physics Alliance (SUPA)
Sheffield Hallam University
SOAS, University of London
Society for General Microbiology
Society for Research into Higher Education
Society of Biology
Software Sustainability Institute
Solace
Space Glasgow – University of Glasgow
Space Leadership Council
St George's – University of London
STFC – Computing advisory panel
STFC Council
STFC – Particle Physics Advisory Panel
STFC – Science Board, with input from Advisory Panels
STFC – Solar System Advisory Panel
Synthetic Biology Leadership Council
The British Sociological Association
The Forestry Commission Research Agency
The Linnaean Society of London
The National Archives
Tokamak Energy Ltd
Transport Systems Catapult
Trym Systems Ltd
UCB Celltech
University College London
UK BioIndustry Association
UK Computing Research Committee
UK industry association for space (UKSpace)
UK National Institutes of Bioscience
Ulster University
Universities Scotland
Universities UK
University Alliance
University and College Union
University of Aberdeen
University of Bath
University of Birmingham
University of Bristol
University of Cambridge
University of Edinburgh
University of Exeter
University of Glasgow
University of Hertfordshire
University of Leeds
University of Leicester
University of Liverpool
University of Manchester

University of Nottingham

University of Oxford

University of Reading

University of Roehampton

University of Sheffield

University of South Wales

University of Southampton

University of Stirling

University of Strathclyde

University of Surrey

University of Sussex

University of the Arts London

University of Warwick

University of York

Victoria and Albert Museum (V&A)

Wellcome Trust

Wellcome Trust Sanger Institute

Welsh Government – Chief Scientific Adviser Wales

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